

Open-source Alloy selection and Lifetime assessment tool for structural components in CSP - 37370

Beyond metals loss: the hidden corrosion induced degradation aspects

1. Impact

- >30% reduction in development costs
- 50% reduction in development time for CSP technologies
- Accurate information on materials compatibility issues in CSP applications

2. Project Goal

- Develop one of a kind material evaluation tool to predict mechanical and corrosion behavior of candidate materials for molten salt/sCO₂ heat exchangers.

3. Method(s)

- Compile existing creep + corrosion data for candidate materials: **740H, 282 and 625**

- Physics-based models to predict impact of creep-corrosion interactions on lifetimes

4. Outcomes

- Successfully integrated underlying physics of creep-corrosion induced degradation processes in sCO₂/molten chloride salts
- Rapid evaluation of material behavior under specified operating conditions

5. Conclusion/Risks

- Enhance tool to address additional degradation mechanisms and materials

6. Team

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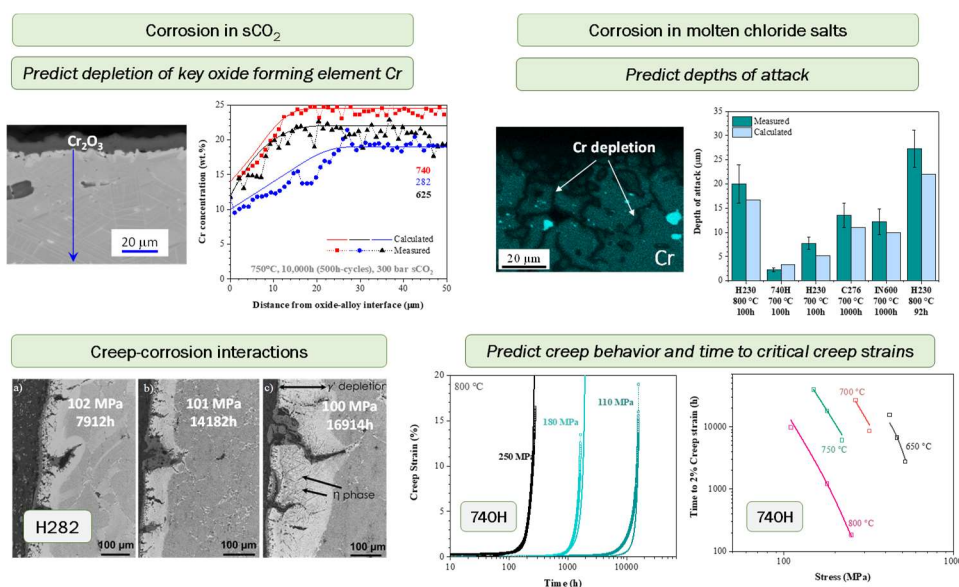


Figure 1. Model capable of predicting creep-corrosion interactions on degradation of Ni-based alloys during operation in sCO₂ and molten chloride salts